The Great Indian Rhinoceros (*R. unicornis*) in Nepal[1]

Report of a fact-finding Survey, April-May 1959

BY

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(*With 3 plates and 3 maps*)

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I. INTRODUCTION

Chitawan and neighbouring areas of Nepal have long been famous for their abundance of big game, including the Great Indian One-horned Rhinoceros, *Rhinoceros unicornis*, which is now one of the vanishing species of the world. For many years this part of southern central Nepal was the strictly guarded shooting preserve of the rulers of that country; but with the advent of democracy and unsettled political conditions in 1951, the exact status of the area and of the rhinoceros in it has not been clear to the outside world. Reports were in circulation of alarming slaughter by poachers in recent years, especially in the year 1958-59; but lack of authentic information prompted the Survival Service Commission of the International Union for the Conservation of Nature to ask me to investigate the distribution and status of the Rhinoceros in Nepal, and to suggest measures for the preservation of this species in Nepal.

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[1] The Bombay Natural History Society, as a token of its deep concern in the reportedly serious plight of the rhinoceros in Nepal, had contributed towards the expenses of Mr. Gee's survey promoted by the Survival Service of the International Union for the Conservation of Nature and Natural Resources. This report, first published in *Oryx*, the journal of the Fauna Preservation Society, is here reproduced by courtesy of the editor, the IUCN, and the author.—EDS.

As it was not possible for me to visit the area concerned until the end of March, 1959, which is the start of the hot weather, when dust, heat, and flies render camping difficult, and as facilities for investigating the problems were somewhat restricted due to the short notice given, the duration of the survey was not extensive. Sufficient time was, however, found to spend two and a half weeks in the Rapti Valley, to traverse almost the whole area, to visit typical localities within the rhinoceros area, both inhabited and uninhabited by rhinoceros, and to obtain first-hand information about the administrative and ecological aspects of the problem.

Having had considerable experience of the Great Indian Rhinoceros and its preservation in Assam and Bengal, I found it most interesting to study the same animal and its habitat in Nepal—where conditions turned out to be very different from those in India.

II. General Review and Summary of Report

The rhinoceros area in Nepal covers approximately 1250 square miles, comprising the valleys of the rivers Narayani, Rapti, and Reu. Although it is *dun* country, it contains most of the sub-tropical vegetation usually associated with *terai* country, and can roughly be divided into (1) riverain, (2) grassland above flood level, and (3) *sal* forest. The hills are almost entirely under *sal* (*Shorea robusta*), a valuable hardwood.

During the cold weather months from November to April, the rhinoceros live mostly in the thick tree and scrub forest of the riverain tracts, whereas in the rainy season from June to September, many of them move away from the partly flooded riverain tracts into grassland or forest. Competition between human settlers and wild life for the grassland area has reached a critical stage, in which wild life has retreated further and further into the unexploited parts of the area and into the thick riverain scrub forest.

As the result of many years of being shot both by sportsmen and poachers and of being driven by villagers from cultivated areas, the rhinoceros of Nepal has adopted a mode of existence and a temperament different from those observed in north-east India where, during the present century, rhinoceros have been strictly protected in their natural habitat. In Nepal they have become nervous, frightened of the sight of human beings, and almost entirely nocturnal. A number of years of strict protection and the allocation of 'living space' in riverain and grassland tracts are needed to enable them to settle down to a normal and peaceful existence.

Poaching remains a serious problem, although the rhinoceros receive much protection from the thick cover, which is not their real habitat, and from the Rhinoceros Protection Department. But a more serious problem is that of increased and increasing influx of both authorized and unauthorized human settlers from the hilly regions of Nepal into the plains which form the rhinoceros area.

I consider that the position is not nearly so hopeless as recent reports had made it out to be, and that in spite of poaching, the number of rhinoceros is in the region of 300.

The Nepal Government has wisely constituted a national park and has plans for a wild life sanctuary. But, unfortunately, the national park in its present form is not an ecological unit in which the animals would have full scope to behave normally, nor is it of sufficient area to include a reasonable amount of rhinoceros habitat and their lines of seasonal and local migration. Apparently the wild life sanctuary now proposed by Government would not enjoy the permanency so necessary for nature conservation. While immediate human needs of land for cultivation and grazing are paramount, the essential long-term need for water and soil conservation and for a specified area to be set apart for the preservation of wild life in its natural habitat, as a wise form of land-use, must not be lost sight of. It is not too late for these very necessary steps to be taken. The area proposed in Section VIII of this Report, to be added to the present national park, contains the greatest possible number of rhinoceros in their natural habitat. At the same time it is almost entirely free from human occupation and consequently there would be a minimum of administrative work.

III. History of the Rhinoceros Area

The present rhinoceros areas of Nepal, in fact the whole of that country, have been up till recent times a closed book to foreigners. Visits by outsiders were discouraged, even forbidden. Perhaps the first foreigner to tour in the Nawalpur, Chitawan, and Reu Valley areas was Mr. E. A. Smythies who, during World War II was Forest Adviser to the Nepal Government. In the course of his duties Smythies visited almost all the submontane tracts along the 500 mile *sal* belts of the Nepal *terai*.

There is some historical evidence that the Rapti Valley, as Chitawan is usually known, was once much more thickly populated than at the beginning of this century, and it is possible that malaria was the chief reason for any subsequent depopulation of the area.

The Rapti Valley has remained closed even to most prospective Nepali settlers, not only because of malaria, but because it was strictly protected as the special shooting preserve of the rulers of Nepal, whose huge camps and elephant beats were known the world over. Up till recent years almost the only people living in the area were simple 'Plains Nepalis'—the Tharus, who appear to have become immune to malaria and who incidentally provide practically all the elephant drivers of that country. These people also provided the labour required for making rough cross-country tracks in the dry cold-weather months and for preparing shooting camps.

A special department of armed men has existed for many years to protect the rhinoceros, tiger, and other game. At the time of my visit it consisted of: 1 Commander (Captain), 1 Assistant (Lieutenant), 4 Subedars, 24 Havildars, and 122 Rhino Guards.

Mr. E. A. Smythies in his book, BIG GAME SHOOTING IN NEPAL (1942), and his wife Olive, in her TIGER LADY (1953) speak in glowing terms of their trips to the Narayani, Rapti, and Reu valleys in the years 1941-1945. They found that, whereas in the rest of the Nepal *terai* there was practically no game left, here was still a sportsman's paradise, with uncounted numbers of rhinoceros and other big game, and comparatively unspoiled habitat.

In 1951 as a result of the political upheaval in which the Rana regime came to an end and democracy came into being, the area underwent a change. Poaching increased to an alarming extent—in fact this seems to have been the peak year for illegal slaughter of rhinoceros.

From 1951 onwards the weakening of protection in the big game reserve meant that malaria was now the main, if not the sole, deterrent to settlers coming from the hills into the Rapti Valley. It was not possible in such a mountainous country as Nepal to prohibit indefinitely the influx of human settlers into grasslands suitable for cultivation of crops. 'Hills Nepalis,' Gurungs, Magars, and others, started to come down into the Rapti Valley unofficially; and officially the Rapti Valley Multi-purpose Development Project began in 1955 to settle cultivators from the hills in the western portion of Chitawan south of Narayangarh, at the rate of 2500 persons a year. By March, 1959, 12,000 persons had been settled on grasslands once occupied only by rhinoceros and other species of wild life, and 52½ square miles had been thus opened up and developed. It is proposed to settle a further 25,000 persons in the Rapti Valley in the near future.

A new gravelled road from Hitaura to Bharatpur and Narayangarh has been constructed jointly by the United States Operations Mission

and the Nepal Government, and this was completed by March 1959, except for a bridge and the big causeway near Hitaura. It was claimed that recent malaria control measures had succeeded in making the valley considerably safer for human occupation.

Besides the 12,000 persons officially settled by the R.V.M.-P. Development Project, a large unspecified number of people from the hills have settled unofficially in various parts of the Rapti Valley during the last few years. It is obvious that if the influx of human settlers continues unchecked wild life will ultimately disappear from this renowned place.

The Nepal Government has been aware of this danger, and during the winter of 1957-58 steps were taken to allot a part of the north of the valley as a national park. In January, 1959, the Mahendra Mriga Kunja (Mahendra Deer Park), or Mahendra National Park, of 68 square miles was formally opened by King Mahendra. It is proposed that a 'Wild Life Sanctuary' (possibly for 10 years only, after which it may revert to shooting blocks) shall be created south of the national park to include most of the rhinoceros area as well as cultivation and grazing areas. Another area has been allotted as 'King's Reserve' and another as 'Shooting Blocks' (see map No. 2).

IV. Geography and Ecology

The present rhinoceros area comprising the valleys of the rivers Narayani, its tributary the Rapti, and the Rapti's tributary the Reu, is often loosely spoken of as part of the Nepal *terai*. *Terai* in northern India and Nepal is, strictly speaking, moist country a few miles from the base of the Himalayas, below the *bhabar*, which is dry country with a subsoil of boulders right at the foot of the Himalayas. Chitawan, or the Rapti Valley, is a *dun*—a plateau or flat valley inside the foothills of the Himalayas; its altitude is between 900 and 1000 feet above sea-level, and it has most of the typical vegetation of the *terai* which is usually at 350 to 600 feet.

The *dun* of the Rapti Valley is approximately 40 miles long from east to west, and varies from 4 miles wide at Ramoli at the eastern end, to about 16 miles at its widest, in the west near the Narayani River. This is the main rhinoceros area, bounded on the north by range upon range of the Mahabharat (Himalayas) and on the south by the Churia Range (Siwaliks). Another area with similar vegetation lies west of the Narayani River and down the bank of that as far west as Tamashpur. A third area is the Reu Valley which is divided from the Rapti Valley by a ridge of the Churia Range. The scenery,

Sal trees in the *dun* of the Rapti Valley, with Himalchuli (25,800 ft.) in the distance.

The River Narayani (or Gandak) near Deoghat in the Mahendra National Park.

Photos : E. P. Gee

Indian rhinoceros in typical grassland habitat in Nepal.

Cow and calf rhinoceros in typical grassland habitat in Nepal.

Photos : E. P. Gee

climate, and vegetation of the Rapti *dun* is very similar to that of the beautiful Corbett National Park of Uttar Pradesh in India.

Records of rainfall for this area are scanty, and have only been kept during the past three years. It appears that 65-70 inches, falling mainly between June and September, is the normal rainfall of Bharatpur at the western end of Chitawan.

The terrain of these three valleys can be conveniently divided into riverain, grassland, and timber forest:

1. Riverain, comprising all the low-lying strips along the river beds as well as the islands in the river beds.

2. Grassland, above flood level, most of which is either being or is about to be occupied, cultivated, and grazed by human settlers.

3. Timber forest, mainly on the higher undulating portions of the *dun*, and covering most of the hills of the area.

Riverain

The Narayani (or Gandak) is a huge river, and occasionally washes a live rhinoceros down into India. In this area it widens out to a mile or two and has islands (*tapoos*). To get over it one often has to cross three, four, or five channels as well as the islands in between, and this takes about half a day. In addition to this mile or more of channels and islands, there runs along each bank a strip of riverain forest and savannah which varies in width up to a mile or more. The low lying islands in the river, which could be classed as sand banks, become flooded during most of the rainy season, June to September. The higher islands and most of the low-lying strips of forest and savannah along the banks get flooded during peak floods of the monsoon. All this area is excellent rhinoceros habitat, containing the water, grasses, reeds, and forest cover they need—particularly during the dry weather, November to May.

The Rapti River is small compared with the Narayani, and in the dry weather can be crossed by jeep at many places where its shingly bed widens out. It too has islands, particularly in its lower reaches, and strips of riverain forest and savannah on either bank, varying in width from a furlong to a mile or so. The Reu, main tributary of the Rapti, is much the same as the Rapti but very much smaller, and the valley very much narrower.

The vegetation of the riverain tracts consists of tree forest and savannah.

Tree Forest.—The trees are mainly of flood resisting species such as *simul* (*Salmalia malabarica*), *sheesham* (*Dalbergia sissoo*), and

khair (*Acacia catechu*). There is a tangled mass of undergrowth, much of which is evergreen and much of which is also thorny, affording the fullest shelter for rhinoceros during the day time, especially in the dry weather.

Savannah.—The vegetation of the savannah varies a great deal according to whether it is above or below the river level of normal rains. It consists mainly of the reeds and grasses usually found in this part of the world, viz. *ekra* (*Erianthus* spp.), *khagri* (*Phragmites karaka*), *nal* (*Arundi donax*), and *thatch* (*Imperata cylindrica*). Frequently there is an intermingling of forest and savannah, forming dense scrub thickets with plenty of cover.

Nearly all the savannah areas of the riverain tracts are burnt off annually by the local villagers to improve the grazing for their cattle —and incidentally, for the wild herbivorous animals. This has been taking place, at least to some extent, for thousands of years, and has become part of the ecological pattern.

Whenever a small stream, known locally as a *khola*, flows out of the hills, or through grassland into a river, there is to be found a small riverain tract usually thickly forested, of varying width according to the size of the tributary. These *kholas* provide corridors for movement of game away from the main rivers as well as thick cover during day time.

Hardly any of the riverain tracts of the three rivers contain houses or even cultivation, as they are liable to flooding during the monsoon months. Practically all of them are made use of by villagers for firewood-cutting, thatch-cutting, and grazing. The thickest of the tree forest and scrub forest areas are seldom interfered with, due to thorns and impenetrability.

Grassland

On leaving the low-lying riverain tracts one finds flat grasslands above flood level stretching for a furlong or two in the Reu Valley, for a mile or two on the west bank of the Narayani River at Sandhna, and for anything up to seven or eight miles in the *dun* north of the Rapti River. These grasslands contain the same reeds and grasses as the savannahs of the riverain tracts, with the addition of other high-ground vegetation which is not flood resistant. The soil is richer and more suitable for the growing of crops at the eastern end than at the western end, where it is lighter and more sandy in composition.

Nearly all the grasslands of the whole rhinoceros area have either been occupied by human settlers for cultivation or grazing, or are

just about to be, with the notable exception of the south bank of the Rapti from Jaimangala village westwards past Darbar (a disused shooting lodge built for King George V when he visited Nepal in 1911) towards the junction of the Reu River and southwards to the Churia range. This is so far mostly unspoiled by human settlers.

Of the grasslands which have for some time been occupied by settlers, in some places the effects of continuous annual burning, overgrazing, cattle-tread, and exposure to increased evaporation, are becoming evident from decreased fertility and increased desiccation.

Timber Forest

In this area the sub-montane timber forest is mainly *sal*, which is to be found growing on some of the well-drained higher grassland, as well as on most of the surrounding hills. It is a tree of great beauty of form and colour, and contributes much to the aesthetic enjoyment of the place, especially when the snows of the Himalayas some 50-80 miles away are visible. The *sal* forests of the area are mostly virgin and contain some of the best trees of this species in the world, rising to 160 feet, especially in the north of the Rapti Valley, in what is now the Mahendra National Park. The *sal* is being exploited by the Forest Department only in the east towards Hitaura. At present there is no exploitation west of Debichor, except some cutting by new settlers.

Most if not all of the *sal* forests are under the jurisdiction of the Forest Department, and are regarded as Reserved Forests. Unfortunately, however, it appears that the boundaries of some of these Reserved Forests have not been clearly demarcated, and unauthorized persons are said to be settling in parts of them with the usual accompaniment of felling and burning for cultivation and grazing. If this is true, it deserves the urgent attention of the authorities, especially as there are so many parts of these forested hills which, forming the catchments of the streams and rivers, need careful conservation in order to avoid soil erosion and desiccation.

V. Administrative and Political

Administration will be considered only as far as the rhinoceros and its preservation are concerned. Three different divisions of the Forest Department are involved. The Rapti Valley is under the Divisional Forest Officer of Chitawan residing at Hitaura; the Nawalpur area (west of the Narayani River) is under the D.F.O of that district residing at Parasi, a journey of some distance from the rhinoceros area with

no roads for travelling; the Reu Valley is under the D.F.O. of Birganj. From the rhinoceros preservation aspect it is unfortunate that this area of Nepal should fall under the jurisdiction of three different D.F.Os., under two separate Circle Conservators, with no means of communication between them except via Kathmandu. The D.F.O., Chitawan, residing at Hitaura, is in charge of the whole Rhinoceros Protection Department which operates in all the three areas; but he is unable officially to visit the Nawalpur or the Reu Valley areas except by arrangement with the D.F.O. of the district concerned. All this is not a criticism of the Forest Department: it merely states the position as it happens to be today. The Narayani River is possibly too great a physical barrier for both sides of it to be under one D.F.O.

Poaching of Rhinoceros

The Rhinoceros Protection Department, the personnel of which has already been given, mans 42 *chowkis* (posts), 26 in the Chitawan area, nine in the Reu Valley, and seven in Nawalpur. Poaching, as has been said, was probably at its peak during 1951. Accounts differ as to the intensity of poaching during the years 1952-58: some people informed me that the position was static, becoming no better and no worse, while others said that during the last three years there has been a slight improvement. Probably official statistics do not give a true picture of the actual amount of poaching during any particular year.

I was told that in 1958, 60 rhinoceros were officially listed as poached: 52 in Chitawan, 6 in Reu Valley, and 2 in Nawalpur. Of these 60 rhinoceros killed by poachers, 24 horns were recovered, and 13 persons arrested and gaoled. In 1959, twelve cases had been detected by the end of March—Chitawan 6, Reu Valley 2, and Nawalpur 4. Of these eight horns had been recovered and seven men arrested.

I had discussion with many people, particularly with the Divisional Forest Officer of Chitawan, who had been for four years in charge of that division, and with Captain Gyan Bahadur Basnayt who had been for two years in charge of the Rhinoceros Protection Department, and there appears to be no evidence of any real organization behind the poachers. Most of the poachers of the Nawalpur area are said to come from the hills, while many of the poachers of Reu Valley and Chitawan come from the south, including India. Some of the poachers are also said to be new settlers from the hills in the Rapti Valley, Magars, Gurungs, and others. The Tharus, 'plains Nepalis', and original inhabitants of this area, are mostly simple and innocent folk,

Cow rhino with her newly born calf in the Rapti Valley, Nepal.

Rhino guard stands near the carcase of a rhinoceros killed by poachers. (Note the skull with horn removed.)

Photos : E. P. Gee

and are believed not to be involved to any great degree in the poaching of rhinoceros.

Most of the rhinoceros poachers in Nepal take refuge first of all in the hills, and then make their way to India, where the horns probably pass through the port of Calcutta to the Far East, particularly to China. The possession and sale of rhinoceros produce is illegal in India—if the place of origin is Bengal or Assam. But if the origin is Nepal, it is probable that its transit through and export from India would not be considered illegal under existing laws and rules. I therefore recommended, while in Kathmandu, that the Government of Nepal should try to effect greater co-ordination of protective measures with the Government of India, in order to prevent this traffic. I now suggest also that the Excise Posts on the India-Nepal border should be kept constantly on the watch for the same purpose.

Development

The last bridges and causeways of the fine gravelled motor road from Hitaura in the east to Bharatpur and Narayangarh in the west are nearing completion. Apart from this there are no all-weather roads. In the dry weather (November to May) all villagers and even isolated houses are connected by bullock-cart tracks which are motorable for jeeps and other high-clearance vehicles.

Since 1955 the Rapti Valley Multi-Purpose Development Project has opened up 53½ square miles of grassland, formerly the home of rhinoceros and other wild life, for 12,000 human settlers, mostly from the hills (see Map No. 2). The implementation of the proposal to settle a further 25,000 persons in the Rapti Valley, combined with the influx of unauthorized settlers, if allowed to continue at its present rate, would mean that hardly any part of this once famous big-game preserve will be left for wild life.

The Mahendra National Park

In its present size and shape, this national park contains about 50 square miles of hills and almost virgin *sal* forest, with a few *kholas* which are dried up in their middle reaches from March till June, and about 18 square miles of mixed evergreen and deciduous forest and grassland with plenty of water in the *kholas* and swamps.

There are villagers with their houses, cultivation, and cattle at Narayangarh, Tikoli, Jirwan, and Jurpani, who still have to move from the national park to alternative sites, with promised assistance from Government. The D.F.O. informed me that he was experiencing some difficulty in enforcing this order, and that the matter was

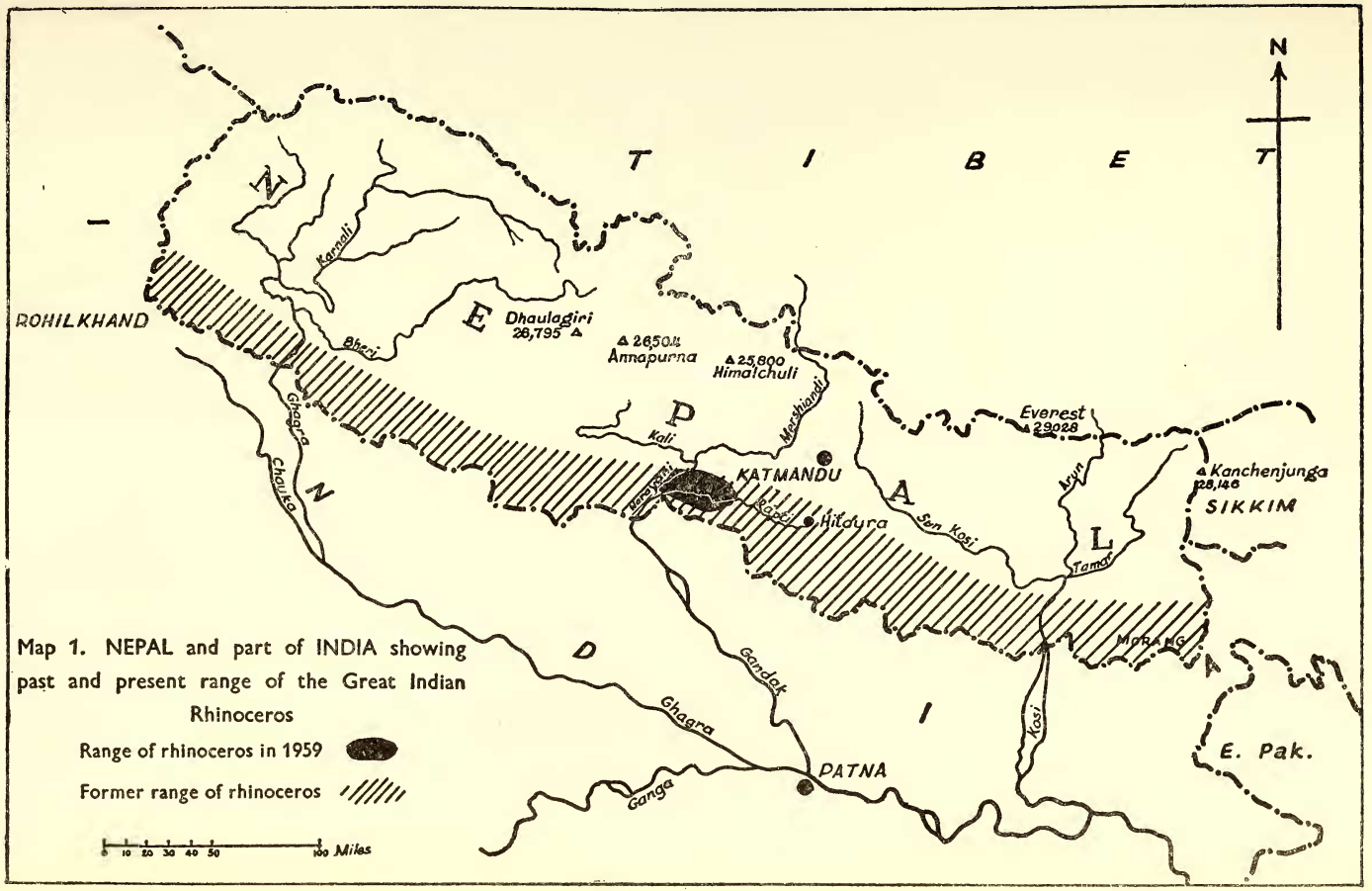
urgent in view of the approaching season for seed-sowing. While I was there the Tikoli villagers expressed their willingness to leave the park area if they were given some of the areas to be re-settled near by. I duly passed on this information to the authorities on my return to Kathmandu.

Necessary additions to the Park.—North of Narayangarh up to Deoghat, the road runs along the river bank from which the mountain and river scenery is very beautiful. When I was there the red-flowering bush *Woodfordia floribunda* was in full bloom, as were several flowering trees; and the *kusum* tree, *Schleichera trijuga*, was in new leaf, shimmering in pale mahogany—all these as well as the *sal* trees in their transition stage from old to new foliage added to the beauty of the scene. But the majestic and unspoiled sal-forested mountains on the opposite bank west of the Narayani and north of the confluence of the rivers Kali Gandaki and Mershiandi, although they contain numbers of gaur, deer, and other wild life, have not been included in the national park. As these parts are mountain and virgin forest almost totally unoccupied by human settlers, they would make a very fine addition to the park without the difficulty of removing human inhabitants.

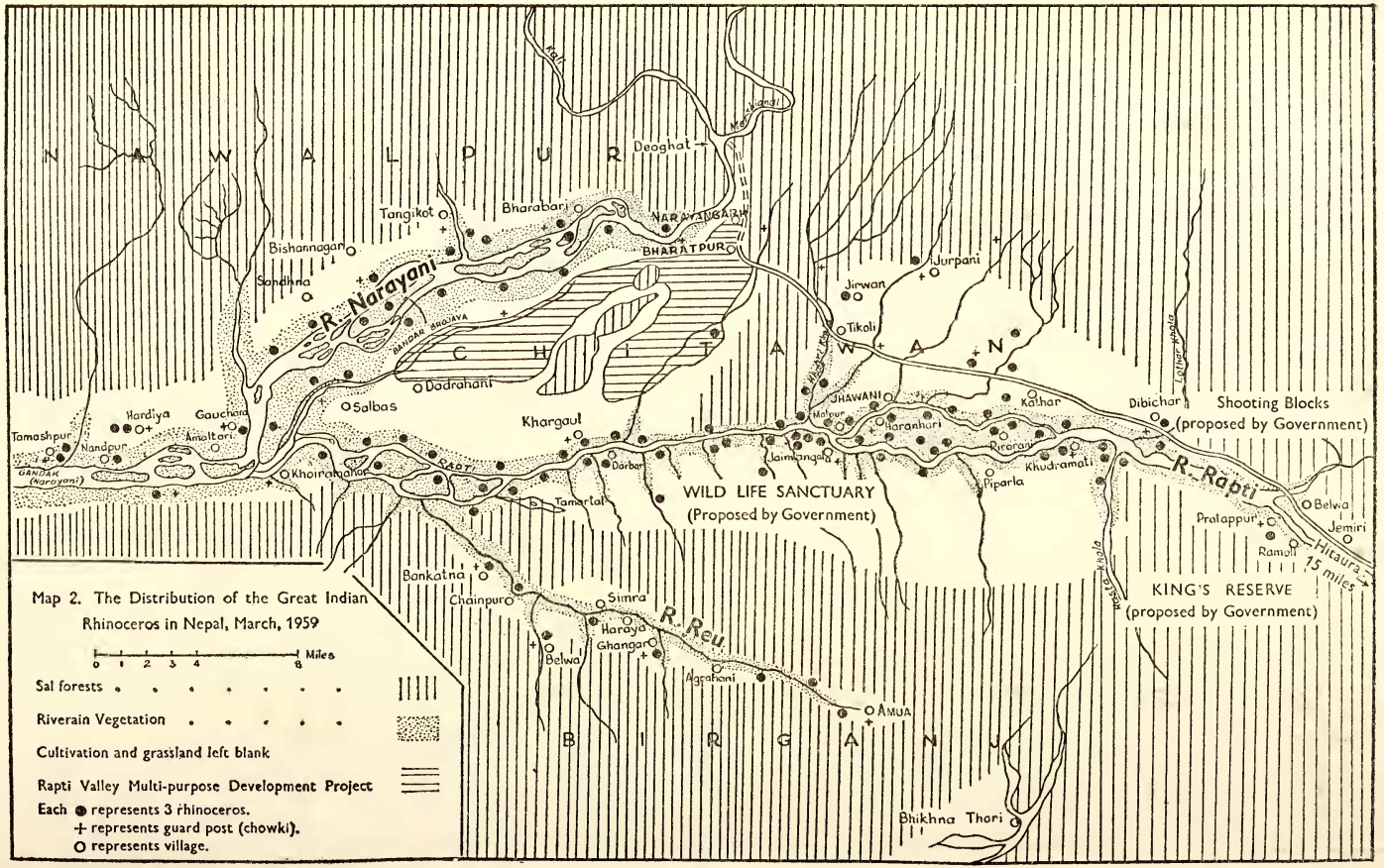
South of the park, from where the new road forms the southern boundary at Tikoli, there is a four to six mile wide strip of comparatively unspoilt *sal* forest and grassland along the Khagri Khola stream down to the Rapti River, where the majority of the rhinoceros are. This strip forms a natural corridor for local seasonal migration of rhinoceros and other animals—but it has not been included in the park.

Without these two additions—the southward corridor for wild life movement along the Khagri Khola to and from the Rapti, being far the more important—the national park is not a viable ecological unit. But if this corridor be included, then it is only one step further to extend it southwards, to include both some of the best rhinoceros country south of the Rapti River and also the upper reaches of the Reu Valley. If this were done, a large percentage of Nepal rhinoceros population would be included in the national park (see Map No. 3). A further advantage of this north-south extension, fully protected under national park rules, would be that wild life could move into it, as the land to the east and west becomes occupied by settlers.

The 'Wild Life Sanctuary' which the Government of Nepal proposes to establish south of the Mahendra National Park (see Map 2) cannot be regarded as a potentially true sanctuary, for a considerable amount of it is already under human occupation, cultivation, or



Map 1. NEPAL and part of INDIA showing past and present range of the Great Indian Rhinoceros


N A W A L P U R
Deoghat
Tangikot
Bharabari
NARAYANGARH
BHARATPUR
Bishannagar
Sandhna
R. Narayani
BANDAR SINGAYA
C H I T A W A N
Jurpani
Jinwan
Tikoli
Dadrahani
Salbas
Hardiya
Gauchara
Tamashpur
Nandpur
Amaltari
GANDAK (Narayani)
Khairahaniar
Khargaul
JHAWANI
Kathar
Dibichar
Shooting Blocks
(proposed by Government)
Harahari
Ricrani
Khudramati
Piparia
Jaimangal
Darbar
Tamartal
WILD LIFE SANCTUARY
(Proposed by Government)
R. Rapti
Belwa
Pratappur
Jemiri
Ramoli
Hitaura
15 miles
KING'S RESERVE
(proposed by Government)
Bankatna
Chainpuro
Simra
R. Reu
Haraya
Ghangar
Belwa
Aggahani
AMUA
B I R G A N J
Bhikhna Thori
Map 2. The Distribution of the Great Indian Rhinoceros in Nepal, March, 1959
0 1 2 3 4 8 Miles
Sal forests
Riverain Vegetation
Cultivation and grassland left blank
Rapti Valley Multi-purpose Development Project
Each ● represents 3 rhinoceros.
+ represents guard post (chowki).
O represents village.

grazing. Moreover, it is proposed in some quarters that this area be a sanctuary for ten years only, after which it is to be opened up again as shooting blocks. Thus during the ten years as a 'sanctuary' it would merely have the dubious status of shooting blocks temporarily closed to shooting. If the best and unspoilt portion of this proposed sanctuary were added to the present national park in order to make a viable unit, then after allowing for reasonable belts of country on either side, as buffer belts where grazing and firewood or thatch cutting are allowed, but in which no settlement or shooting except bona fide crop protection is permitted, the rest of the area might be opened as shooting blocks under strict control with full protection for rhinoceros and other rare species.

Shooting Blocks and King's Reserve

The area north of the Rapti at its eastern end, which the Government proposes should become 'Shooting Blocks', consists mainly of foothills of the Mahabharat Range, and is under *sal* forest. The area south of the Rapti proposed as 'King's Reserve' is part of the Churia Range, and also forested with *sal*. Both these propositions appear reasonable (see Map No. 2). They contain a few rhinoceros at their western extremities, under the protection of the Rhinoceros Protection Department.

A project believed to be in the blue-print stage is to divert the water of the Khagri Khola from a point about one mile north of Tikoli in the Mahendra National Park, and also the water of certain other streams in the vicinity, to irrigate part of the newly-settled grassland south of Bharatpur. If this were done, some of the rhinoceros area in the south of the present Mahendra National Park would dry up. Moreover, the only stream in the 'corridor' needed for extending the present park southwards to the Rapti river, would cease to flow in the dry weather. This project is a serious threat to nature and wild life preservation; it is to be hoped that it will be shelved or modified.

VI. General Account of the Survey

After a brief halt in Calcutta to discuss with Dr. Roonwal (Director of the Zoological Survey of India and Secretary-General of the Indian Board for Wild Life) ways of assisting Nepal to stop any possible traffic of rhinoceros produce through India, I arrived at Kathmandu by air on 15th March. There I spent six days before going into camp in the rhinoceros areas, which are a day's journey

by road. This period was very usefully employed in making contact with officials and non-officials, and in obtaining information of every description. These contacts included: General Kiran, S.J.B.R. (Shumshere Jung Bahadur Rana), who is the present authoritative and acknowledged leader in all matters pertaining to sport and wild life in Nepal; Field Marshal Kaiser, S.J.B.R., who, though he has not visited the rhinoceros area since 1933, has a vast store of knowledge of *shikar* and natural history; Mr. Balarama Paul Baidya, Chief Forest Officer; Major Lok Bikram, in charge of elephants (Government and others). Captain Tej Jung Thapa, Circle Conservator; Colonel and Mrs. Proud of the British Embassy; Mr. N. Pal, Adviser on Forests, India Aid Mission; and Mr. Boris Lissanevitch, of the Hotel Royal, who knows the rhinoceros area.

This period of six days was also necessary to procure permits and letters of introduction to officials in the rhinoceros area—without these it would not have been possible to proceed.

On 22nd March I motored along the Tribhuvan Raj Path, the new road built by the Indian Army, over the Simbanjong Pass (8162 feet above sea-level), to Hitaura at the eastern end of the area. Here I met Mr. Sudhir Jung Thapa, the Divisional Forest Officer in charge of the Chitawan (Rapti Valley) Division, with whom I was to spend most of the subsequent sixteen days touring.

The following day we jeeped westwards along the new Rapti Valley road, with the proposed King's Reserve on our left and the proposed Shooting Blocks on the steep hills on our right, both mainly under *sal* forest. Here in the upper reaches of the Rapti the riverain strip is narrow. After crossing the gravelly bed of the Rapti River at the tiny villages of Ramoli and Pratappur we made two tours into the forest along rough forest roads used by timber contractors. This gave me an idea of the terrain of the King's Reserve, at the western end of which about six rhinoceros are believed to exist. Rhinoceros wander far afield during the monsoon months, even into the town of Hitaura, I was told.

On 24th March we went into camp at Tikoli, which is at the south-eastern point of the newly-constituted Mahendra National Park, and a convenient centre for seeing the area where the rhinoceros density is greatest—Jhawani and neighbourhood. Here we were joind by Captain Gyan Bahadur Basnayt and Lieutenant Gaj Raj Joshi of the Rhinoceros Protection Department. Although our food, luggage, and camping equipment had not yet arrived, I took an elephant out in the afternoon southwards along the Khagri Khola stream towards the Rapti. To the east of the Khagri Khola all is

cultivation and villages, while to the west of the stream it is mainly unspoilt *sal* forest with patches of savannah. We saw tracks and dung of rhinoceros and found two of them in a secluded wallow in the thick scrub forest of the riverain tract of this stream. On our approach they immediately made off into cover.

Shortly after arrival at Tikoli, I opened up a large map of the area, and questioned the two officers of the Rhinoceros Protection Department about the numbers of rhinoceros at each *chowki* (post), sometimes at each part of each *chowki*. After explaining to them that conservative figures were required, I compared their figures place by place with those given by the D.F.O., and then reduced them in all cases. I also obtained from them all the information I could on the types of terrain, localities of cultivation, grazing, and unspoiled grassland or forest. Then I was able to re-plan my tour programme so that I could visit a sample of each rhinoceros area, and a sample of each type of terrain. So my tour was not a 'conducted one'—in fact, I often later insisted on going to a spot other than that recommended for finding the greatest numbers of rhinoceros.

On the morning of 25th March we went to the Chitawan *hatisar* (elephant station) and took two elephants southwards to the Rapti River, to a riverain area near Malpur and Haranhari. Here we located six rhinoceros, including a cow and young calf, all of which appeared very frightened. On 26th March we again went to the *hatisar* and proceeded with three elephants to another area west of Haranhari. Here we found 10 rhinoceros, including 2 cows and young calves, also 3 young two-year-olds in a 'school' of their own. Rhinoceros of this age are usually found still with their mothers, and I presume that these three had been driven off by their mothers when new calves were born. Nearly all these 16 rhinoceros were in dense scrub riverain forest, which is not the real habitat of this species. They were in thick cover even in the early morning. Although most of the grasslands had been burnt off, and although the young shoots were coming up—so palatable to herbivorous animals—no rhinoceros were found grazing in the open grassy areas, as one would have found in Kaziranga and other sanctuaries of Assam. There were also many fewer mud or water wallows than I expected. This might have been partly due to the sandy nature of the soil, and partly to the fact that a wallowing rhinoceros falls an easy victim to poachers. The rhinoceros in Nepal appeared to be very much more nocturnal than those in Assam, and very much more shy of human beings. Their droppings were scattered in small heaps or as single droppings

instead of the large heaps found in Assam, where they lead a more natural and peaceful life.

As all the villagers of the area build *tands* (look-out towers for frightening away crop-raiding rhinoceros) both in their fields and also actually in their village vegetable gardens—in Assam the similar *tongis* are only built in the fields near a sanctuary—and as rhinoceros ditches are built round most vegetable gardens, it was abundantly clear that the rhinoceros roamed far and wide over cultivated areas during the night, and lay up in hiding during the day. This was borne out by reports from the villagers, and from fresh rhinoceros tracks and dung seen near the villages.

The riverain forest in places is very thick, often with thorny and evergreen bush, providing ideal, though unnatural, cover for the rhinoceros. Visibility was very limited. Consequently numbers of rhinoceros we observed depended largely on the number of elephants we could muster on each visit. An observer on a single elephant could only find rhinoceros within a strip of country extending sometimes ten, sometimes twenty, yards on each side of him during a traverse in such forest. A party with three elephants could naturally traverse an area about three times as great. It is, therefore, not only for display that the rulers of Nepal have always employed a great number of elephants, over fifty at a time, for their shoots: a large number of elephants is actually required to locate and drive the game in such thick country.

Incidentally, the last of the big shoots, in January 1959, had taken place in this very area, and over fifty elephants had driven a different square mile on three consecutive days in order to catch rhinoceros calves for foreign zoological gardens. They circled 5, 7, and 13 rhinoceros respectively on these three occasions. Although this year no cow rhinoceros were shot, as has been done in previous years in order to obtain the calf, the disturbance and fright caused to the rhinoceros of this particular place must have been considerable.

Several participants of this shoot informed me that between 50 and 60 different rhinoceros had been counted in the area covered by the shoot, which was spread over some 40 square miles (about 4 miles north to south by 10 miles west to east) between the Khagri Khola and Kathar.

The Mahendra National Park

While in camp at Tikoli, I was able to pay three visits to the Mahendra National Park. In the afternoon of 25th March, we went by jeep via Jurpani across the *kholas* and back by Narayangarh. The

chowki (post) at Tandkhola was a very beautiful site with a fine view of *sal*-forested hills, but there was no water in the stream. In fact, there was no water in any of the four bouldery and sandy *kholas* we crossed, although there reportedly had been during previous months. I was informed that there was a little water higher up, and that it runs underground at this point, to reappear again lower down in the rhinoceros area of the national park. One or two water-holes provide water for gaur, sambar, chital, and other animals in this northern portion of the park.

In the afternoon of 26th and in the morning of 27th March, I made two extensive trips on an elephant into the south-east part of the park, where there were reported to be 12-30 rhinoceros. Although I found a few fresh tracks and droppings, I could find no rhinoceros on either of these trips, but on my return to camp I was informed that many were to be found here during the rains, though I could get no exact information about local or seasonal migrations. As this was ideal rhinoceros habitat with plenty of grassland as well as water and cover, I was puzzled as to why they should have migrated southwards to the Rapti, where there was less grazing and more human interference. My elephant on these two trips had been greatly worried by large horse-flies or gad-flies (locally known as *dans*), and possibly this may at least partly provide the answer to this puzzle.

The D.F.O. assured me that the previous year he had visited the area in the middle of April and had seen rhinoceros; and both the lieutenant and the havildar of the Rhinoceros Protection Department said that a considerable number of rhinoceros come here in the monsoon months. I therefore became convinced that a corridor for migration of rhinoceros between the national park and the Rapti River was urgently needed, and that the national park could well be extended southwards to make it. An extract from my diary reads: 'As there is forest and little or no cultivation west of the Khagri Khola, the national park could be extended southwards in a corridor about four miles wide, to include the Rapti area (near Jhowani) . . . and then southwards to the Siwalik Hills, possibly to include the rhino of the Reu Valley.' As my tour progressed, I became more and more sure that the above measure was urgently necessary if the rhinoceros of Nepal were to be preserved.

I was disappointed with my first three visits to the national park, but on 27th March, I visited Deoghat after visiting Mr. Malla, Chief of the Rapti Valley Multi-Purpose Development Project. Motoring from Narayangarh along the bank of the Narayani, I was much

impressed by the magnificent river and mountain scenery. The *kusum* trees were coming into new leaf and were a blaze of pale mahogany colour, and the bright red of the *Woodfordia floribunda* was much in evidence, both adding to the beauty of the *sal* trees now in their transitional stage. It then occurred to me that the forested mountains to the west of the Narayani River and also those north of the confluence of the two rivers at Deoghat, almost totally uninhabited as I was told, could well be added to the national park. I also found that the national park idea seemed to have caught on in the district, and frequent references were made to the 'national park' rather than to the 'mriga kunja'. I think that this should be encouraged, and that Mahendra National Park should be this park's permanent name.

Shortly after midday the D.F.O. returned to Hitaura, and I went with the officers south-westwards through the recently settled area to Dadrahani, in order to cross the Narayani River to Sandhna in Nawalpur District. Very few people ever go to this 'remote' and inaccessible area. It took us half a day to cross the different channels and islands of the river, and we reached our camp site long after dark, having travelled by truck, dug-out boat, elephant, bullock-cart, and on foot.

On the 29th we visited the riverain forest near Sandhna with one elephant, and found one rhinoceros in thick cover. Then we crossed to Bandar Bhojaya *tapoo* and found 4 rhinoceros in a wallow, including a cow and tiny calf. This cow charged us twice in the thick forest. During the second charge my elephant tried to bolt and my hat and lens hood were knocked off. After we had dismounted to look for the lens hood, back came the irate rhinoceros for a third charge! In the afternoon we visited more riverain forest, and saw 3 rhinoceros. None of these 8 rhinoceros had been listed by us on the map at Tikoli.

On 30th March plans were made for me to visit an area south-west of camp, where they were anxious to show me a great number of rhinoceros. After my three recent visits to riverain tract of the Narayani, I was able to take their word for that and we visited instead the *sal* forest and hills to the west, to see that kind of terrain. Here I found tracks and droppings of rhinoceros in the *kholas*, and saw one animal. In this range of hills there are patches of grassland, *kholas* with water, and a belt of swampy ground all along the base between the hills and the 1½ mile wide strip of cultivation. This was useful information, proving that these hills could and did hold rhinoceros, and that during monsoon floods they migrated to the higher hilly region.

Having made a sample survey of the comparatively 'unknown' Nawalpur area, I re-crossed the wide Narayani River back into the Chitawan District, to camp at Dadrahani. In the afternoon I took an elephant into the mile-wide riverain strip on the east bank of the Narayani, and saw tracks and droppings of rhinoceros. Six, including two cows and calves, were said to be here. The D.F.O. had rejoined us from Hitaura. On 1st April I went to see the area at the junction of the Rapti and Narayani rivers, and also the *tals* or small lakes on the south side of the Rapti. All round here is magnificent thick rhinoceros habitat, and we saw fresh tracks and droppings, though no rhinoceros. The *tals* turned out to be small and disappointing—no comparision with the *bheels* of Kaziranga where so many rhinoceros and other species are to be seen grazing out in the open.

On 2nd April we jeeped through cultivated land, through a belt of unspoilt *sal* forest, and through more cultivated land to camp at Khargaul. This *sal*-forested portion of the *dun* contains some unspoilt country with swamp deer, chital, pig, and other animals. As it apparently contains no rhinoceros in the dry weather, I have not included it in my recommendations, but the Nepal Government could well consider creating a small wild life sanctuary here.

After a night at Sandhna of unexpected and unseasonal rain, the snows of the Himalayas were a magnificent spectacle—this was the only day on which they were clearly visible in a cloudless and hazeless sky. Only a tiny peak of Dhaulagiri (26,795 feet) was visible behind a nearer range, but the whole massifs of Annapurna (26,504 feet) and Himalchuli (25,800 feet) towered in splendour before our eyes—more than ample compensation for being washed out two nights before.

I particularly wanted to see the country round Darbar, and also another and larger lake called Tamortal, and the connecting corridor through the Churia Range from the Rapti to the Reu Valley. The riverain forest and grassland near Darbar are comparatively unspoilt and ungrazed, but I saw no wild life. The *tal*, set in the midst of *sal* forest, was also disappointing, but north of the Rapti on our way back to camp on three elephants we found 4 rhinoceros within half a mile of our tents, a not unusual phenomenon as both in Nepal and north-east India rhinoceros seem to prefer the vicinity of villages and cultivation to unspoilt country.

The cart track from Darbar, past Tamortal, leads from the Rapti Valley into the Reu Valley; and while at Tamortal we were only a few miles from the Reu river. I would have liked to have had the time to visit the Reu Valley, but this could not be done. I was,

however, informed by the D.F.O. that he went there as recently as November 1958, and saw 8 rhinoceros. He described to me all the conditions of the place—similar to those in the Rapti and Narayani valleys, only on a smaller scale.

The next morning we took two elephants—one had broken loose during the night and disappeared into the forest—and traversed some more riverain country north of the Rapti, finding two rhinoceros. In the afternoon I took one elephant, the 'escaped' one which had been recaptured, into the riverain belt near the camp, and photographed 2 rhinoceros.

Having seen a sample of the country round Darbar, both north and south of the Rapti, I said I would like to drive through the middle of the belt of *sal* forest and grassland that would, if approved of by the Nepal Government, be such a useful addition as a corridor to the Mahendra National Park. I also wanted to see the country to the south of this corridor, south of the Rapti. Accordingly on 4th April, we jeeped through this corridor at a point where it must have been about 6 miles wide. It consisted of comparatively unspoilt *sal* forest with patches of grassland, swamps, water holes, and of course the Khagri Khola on the eastern side. It proved to be ideal habitat for rhinoceros, deer, and other animals.

Eventually we arrived at Jaimangala and camped there, in spite of the fact that cholera and smallpox were in epidemic form near by. In the evening we took out four elephants and within one mile of camp found 9 rhinoceros. I personally saw 5, including 2 cows with young calves, and I have no reason to doubt the veracity of the others who saw an additional 4; for, on the following day I saw different rhinoceros on this very same spot. While trying to photograph a rhinoceros cow and calf, our four elephants at one time were encircling 4 rhinoceros, 1 sambar stag, 2 hog deer, and 2 bears. From Jaimangala westwards, most of the country appeared to be unspoilt and unoccupied by villagers, confirming my opinion that this area should be included in a southward extension of the national park.

On the following day we explored, on three elephants, the area westwards on the south bank of the Rapti, and returned along the north bank through the corridor. On the way out in the early morning I inspected and photographed the carcases of 2 rhinoceros shot this year by poachers. I was told that the poachers themselves might have been shot had not 7 rounds of ammunition fired at them failed to go off.

Although we had seen 9 rhinoceros near the camp on the previous day, yet in this wilder country further away from the camp we saw

nothing—until finally we came across a cow rhinoceros defending her pink, newly-born calf against a tiger. Our approach apparently frightened away the tiger, The rhinoceros with characteristic lack of gratitude then charged my elephant two or three times. Photography was rendered very difficult by the fact that in Nepal the elephants are trained to charge back at a rhinoceros. In spite of this commotion, and in spite of the waving arms of the excited and gesticulating elephant-driver, I managed to secure some photographs of the newly-born calf with its mother—they must be unique.

On our return along the north bank of the Rapti, we suddenly saw, peering out of the tangle of unburnt grass, the head and horns of a solitary bull gaur (*Bos gaurus*), which immediately made off. We then searched without success for rhinoceros in two *kholas,* which had water and evergreen forest suitable for these animals. When we were near camp I dismounted from the elephant, stalked and photographed on foot 5 of the rhinoceros seen by us on the previous day, as they lay in their wallows. There were also four sambar hinds within a mile of the village.

In the evening I visited a riverain area north-east of the camp with one elephant, and found 4 rhinoceros including a cow and a young calf. Three of these were in thick grass within one furlong of our tents. The experience of this day in this area, as in all the other areas I visited, shows that rhinoceros and other wild animals prefer the vicinity of villages and cultivation to the unspoilt forests and grasslands. The existence of thick cover in the form of evergreen and thorny scrub forest enables them to do this. The probable reasons are firstly and mainly a predilection for man-grown crops, secondly a certain amount of safety from predators, both human and feline.

On the morning of 6th April, we struck camp and proceeded to the house of the captain of the Rhinoceros Protection Department, where I was shown some of the rhinoceros horns and personal possessions recovered from poachers. Thence back to the main road and eastwards past the proposed 'Shooting Blocks' and 'King's Reserve' to Hitaura. After discussions with the D.F.O., I returned the following day over the Simbanjong Pass to Kathmandu. There I spent three days discussing my observations in the rhinoceros area, with the people whom I had met earlier. Finally I flew from Nepal to India on 11th April.

VII. Status, Distribution and Future of the Rhinoceros in Nepal

It is difficult to obtain accurate information about the former range and distribution of rhinoceros in Nepal. W. T. Blanford, in THE FAUNA OF BRITISH INDIA, MAMMALIA, Part II (1891), wrote of it as being found in 1850 '. . . . along the base of the Himalayas in Nepal and as far west as Rohilcund' (a district of India near the border of West Nepal). From information obtained in Kathmandu it appears that the last rhinoceros in the Morang District of south-eastern Nepal was shot at the turn of the present century, and that the last rhinoceros in the area immediately east of Chitawan was killed in 1927. It would be safe to say that about 100 years ago rhinoceros were found all along the southern border of Nepal. Since 1930 they have been confined to the area covered by this Report.

Referring to the rhinoceros population of Nepal in 1942, E. A. Smythies wrote: 'It is estimated that at present the total number is between 300 and 400.' In 1953 the Forest Department of Nepal estimated that there were 1000 rhino, and in 1957, 600. Considering the extent of the rhinoceros area and the thick cover of the riverain tracts into which the rhinoceros can and do retreat, these estimates are not beyond the bounds of probability. Unfortunately, however, no serious attempt ever seems to have been made to estimate the numbers scientifically by sample surveys, by studying seasonal migrations, and so forth. A census is not possible owing to the density of the riverain scrub forest.

In a Miscellaneous Note published in the *Journal of the Bombay Natural History Society* in August 1957, P. D. Stracey, who is Director of Forest Education in India and had been on an official visit to Nepal in April of that year, gives an estimate in the region of 400. He based this figure on a brief visit to the area and on talks with Forest Officers and others. It appears to have been a reasonable figure, though the 'rhinoceros area' map supplied to him was inaccurate.

In Kathmandu, before my tour, I noted down the estimates of rhinoceros population made by various people. These included:

General Kiran, S.J.B.R. ...	... 250-300
Chief Forest Officer ...	... 300-400
Captain Tej Jung Thapa ...	... 320

On arrival at the rhinoceros area, I was given the following estimates:

Divisional Forest Officer ...	... 320
Captain Gyan Bahadur Basnayt	... 530
Lieutenant Gaj Raj Joshi ...	... 380

On the 13 elephant trips on which I saw rhinoceros, the number of elephants taken out averaged 2.15. This is important, as the larger the number of elephants used in such thick country, the more chance there is of rhinoceros being encountered. On these 13 trips I personally counted 43 rhinoceros, of which 9 were young calves. On the same trips, other members of the party on other elephants saw an additional 14, bringing the total to 57 rhinoceros seen, including 12 young calves. Visibility varied from between 5 and 20 yards in the thicker forest to between 20 and 100 yards in the more open areas; so the actual ground covered in each traverse was not great and I do not believe I actually saw one-tenth of the ground inhabited by rhinoceros.

From the detailed information supplied to me by the D.F.O., Chitawan, and by the officers of the Rhinoceros Protection Department and others, which I checked in sample surveys on 18 elephant trips in different parts of the rhinoceros area, I estimate that there are now about 300 rhinoceros in Nepal. I have marked their approximate distribution as in March-April 1959 by black dots on Maps 2 and 3, each dot representing 3 rhinoceros. Should my figure of 300 be an overestimate—I do not think that it is—or an underestimate, which is quite possible, the numbers represented by each dot can be adjusted. The pattern of distribution would remain, subject to seasonal local migrations.

It will be noticed that the distribution of rhinoceros when I was there, the dry season of March and April when the burnt-off grassy areas were beginning to appear green with young shoots, was almost entirely in or very near the riverain tracts. This, I consider, was not so much due to scarcity of water and grazing in other areas, as to the thick cover provided by the evergreen and thorny scrub forest in these tracts. It will also be seen that rhinoceros in Nepal, as in NE. India, show a marked predilection for man-grown crops and vegetables, and therefore choose a habitat as near as possible to villages and cultivation. They do not object to sharing their grazing with domestic buffaloes and cattle, though it appears that in Nepal these common grazing grounds are grazed by domestic beasts by day and rhinoceros by night. In Kaziranga Sanctuary of Assam also, the regions of greatest density of rhinoceros population are nearest to the largest areas of cultivation and villages. It is an inescapable fact that whatever areas of unspoilt country may be set aside for rhinoceros preservation, they will probably continue to inhabit those riverain tracts which are nearest to cultivated land. The presence of *tands* (look-out

towers) and rhinoceros ditches in the fields and vegetable gardens over the whole area considered in this Report would alone prove the presence of rhinoceros—if such proof were needed in addition to tracks, dung, and the animals themselves.

With regard to movements of rhinoceros, I was informed that there has been a noticeable shift from the area now being settled by the Rapti Valley Multi-purpose Development Project to the Nawalpur district and to other parts of the Rapti Valley. From all accounts, the grasslands south-west of Bharatpur down to Salbas, along the east bank of the Narayani River, used to be the best tracts for rhinoceros; but they are no longer so. There is little or no information to be had on local migrations, though this seasonal movement is bound to take place each monsoon as the riverain tracts become partly or wholly flooded. The general direction of this movement would be away from the rivers towards the grassy tracts and *kholas* at the foot of the *sal*-forested hills. The most important line of migration, as has already been pointed out, is along the Khagri Khola and the belt of unspoilt country on its western bank. It is very desirable that local officers should study these seasonal movements.

The great danger to rhinoceros from poachers, on account of the horns which are sold and commercialized as an aphrodisiac, exists and will continue to exist. It is being dealt with by the Rhinoceros Protection Department which is doing good work in difficult circumstances. In fact, it is surprising that more rhinoceros are not shot by poachers. The officers in charge possess no maps, and appear to have no instructions to observe or study the habits, distribution, numbers, or movements of rhinoceros. Many of the rhinoceros guards (sepoys) have received no training. The service conditions of these guards, Rs. 30 per month Nepal currency (£1 7*s*. 0*d*.) with no rations, no uniform and no accommodation, are inadequate and are below those enjoyed by the *hatisar* personnel. Some of the ammunition does not 'go off'. No rewards or promotions appear to be awarded for good work, such as the capture of poachers or recovery of horns. As the value of these horns is very high—as much as Rs. 3135 Indian currency (£235) was paid to a poacher for a horn obtained in the Reu Valley—and the temptation to a lowly-paid guard very great, a system of promotion and rewards would have a stimulating effect.

But a danger to the rhinoceros of Nepal greater than that from poachers has arisen in the development and settlement of the grasslands of the Rapti Valley. As there is now increased competition for

grasslands between human occupants and wild life, a decision will have to be made by the Government as to whether settlement of human population is going to occupy all the available land of the Rapti Valley, or whether water and soil conservation and wild life preservation will have their rightful place in development schemes. It is confidently to be hoped that as a matter of wise land-use the authorities will set apart the appropriate areas for these urgently necessary requirements.

The habits of the rhinoceros of Nepal have been affected by two main factors. Firstly, rhinoceros have been shot for sport as well as by poachers for a very long time, if not since time immemorial. Secondly, they have been pushed further and further back from their habitat and feeding grounds, particularly during the past four years, by the influx into the grasslands of both authorized and unauthorized settlers. Consequently they have become more and more hunted and persecuted, and like an outlawed political party have 'gone underground', taking refuge in the thick scrub forest of the riverain tracts. They have become very scared, and if encountered in their hiding places frequently charge before rushing away to another hiding place. They have become very much more nocturnal than rhinoceros in India, and are rarely if ever to be found grazing in the open during day time. Their dung often consists of individual droppings, or very small dung heaps instead of the large dung heaps found in Assam, and this is probably due to their more furtive existence. Though Jungle Mynas (*Aethiopsar fuscus*) settle on rhinoceros in Nepal, Cattle Egrets (*Bubulcus ibis*) are never found in their company, though they are always so found in Assam; and this also is probably due to the rhinoceros' nocturnal habits and furtive existence.

The fact that so many rhinoceros cows were seen with young calves (12 young calves out of 57 rhinoceros seen by my party) goes to show that the rhinoceros of Nepal have become accustomed to the new conditions in which they have to live and are actually thriving.

The average horn I saw in Nepal was very much smaller than in Assam, and I saw no old rhinoceros. Both sportsmen and poachers look for large horns; furthermore the older rhinoceros (often with large horns) are the more easily shot.

At the present moment the position of the rhinoceros in Nepal is very insecure, especially considering the impending influx of 25,000 more authorized settlers, and an unknown number of unauthorized ones, into the Rapti Valley. An irrigation scheme also is proposed which would lead off the water of the Khagri Khola and other streams

to the newly-settled area. If this is put into effect, it will drain to a dangerously low level the rhinoceros habitat in the region of Tikoli and southwards to the Rapti.

It is not too late even now to allocate certain areas in the catchments of the rivers and streams for strict protection as a necessary and urgent measure of water and soil conservation; to demarcate clearly the boundaries of Reserved Forests and to prevent indiscriminate cutting and burning within them; and to allocate sufficient areas for rhinoceros and other wild life to live in safety and security alongside human settlers.

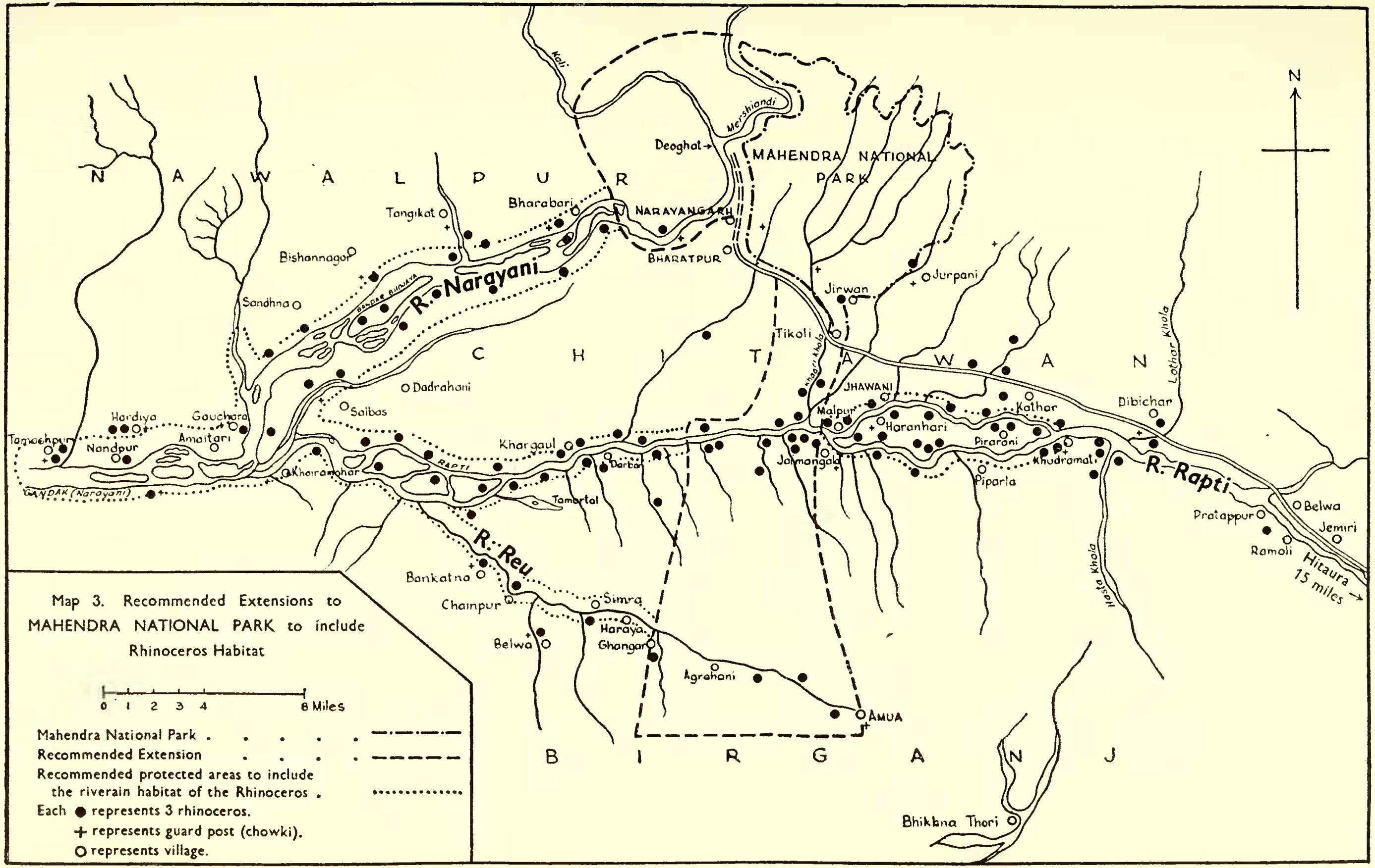
Owing to the various pressures and peculiar circumstances affecting the status of rhinoceros in Nepal it is recommended that the policy governing the administration of the national park and wild life preservation in general be a flexible one. While adhering as far as possible to the principles accepted by leading nature conservationists in the world, it is possible that certain departures from these principles might prove advantageous for the preservation of the rhinoceros. For instance, this species' partiality for a habitat near villages might indicate that a few carefully selected and strictly controlled 'forest villages' inside the national park could be allowed, in which rhinoceros guards would have assistance and protection in their operations against poachers. Also the fact that tigers prey on very young rhinoceros might render it advisable to control the numbers of tigers in the rhinoceros inhabited areas, should they become excessive. Any wild life management policy would naturally have to be based on ecological study.

VIII. Recommendations (see Map 3)

The following recommendations are made:

(1) That the present Mahendra National Park be enlarged and extended (*a*) southwards to include the migration routes and rhinoceros areas as far as the Reu valley, and (*b*) north-westwards to include the scenic area in the north-west. See Sections V and VI and Map 3. And that this national park be fully protected with buffer belts where possible.

(2) That the riverain tracts of the Narayani, Rapti, and Reu rivers which contain rhinoceros be designated as National Park Extension Areas or Protected Areas, with rights of local villagers for grazing, cutting firewood, and cutting thatch to continue as before, but to remain free of settlement and cultivation.


N
NAWALPUR
CHITWAN
BIRGANJ
MAHENDRA NATIONAL PARK
R. Narayani
R. Rapti
R. Reu
Kali
Mershiandi
Deoghat
NARAYANGARH
BHARATPUR
Bharabari
Tangikat
Bishannagar
Sandhna
Dadrahani
Saibas
Hardiya
Gauchara
Amaitari
Tamaspur
Nandpur
GANDAK (Narayani)
Khoiramohar
Khargaul
Darta
Tamartal
Tikoli
Jirwan
Jurpani
JHAWANI
Malpur
Haranhari
Jaimangala
Pirarani
Kathar
Khudramati
Piparla
Dibichar
Lothar Khola
Hasta Khola
Pratappur
Ramoli
Belwa
Jemiri
Hitaura 15 miles
Bankatna
Chainpur
Simra
Haraya
Ghangar
Belwa
Agrahani
AMUA
Bhikhna Thori

Map 3. Recommended Extensions to MAHENDRA NATIONAL PARK to include Rhinoceros Habitat

0 1 2 3 4 8 Miles

Mahendra National Park . . . . .
Recommended Extension . . . . .
Recommended protected areas to include the riverain habitat of the Rhinoceros .
Each ● represents 3 rhinoceros.
+ represents guard post (chowki).
O represents village.

(3) That a wild life sanctuary or national park be created in a suitable area in the Morang District of southeast Nepal in order to preserve the few remaining wild buffalo there; and that a few pairs of rhinoceros be re-introduced into that area so that there will be a second locality for the preservation of the rhinoceros in Nepal.

(4) That the Rhinoceros Protection Department be strengthened, chiefly by reorganization and by improvement of service conditions, as noted in Section VII. And that a suitably qualified officer be appointed, who could assume complete charge of wild life preservation in the rhinoceros area, including the national park.

(5) That a Nepal Board for Wild Life be constituted which would be the authority for all matters pertaining to wild life preservation in the country.

(6) That education and publicity be undertaken in order to develop consciousness among the people of the cultural and economic value of wild life and nature conservation, and to develop tourism as an important economic factor in support of wild life preservation.

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